NASA SP-7011 (413)
April 1996

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

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Introduction

This issue of *Aerospace Medicine and Biology, A Continuing Bibliography with Indexes* (NASA SP-7011) lists 40 reports, articles, and other documents recently announced in the NASA STI Database.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which humans are subjected during and following simulated or actual flight in the Earth's atmosphere or in interplanetary space. References describing similar effects on biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. Applied research receives the most emphasis, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the publication consists of a standard bibliographic citation accompanied, in most cases, by an abstract.

Two indexes—subject and author are included.

The NASA CASI price code table, addresses of organizations, and document availability information are located at the back of this issue.

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Records are arranged in categories 51 through 55, the Life Sciences division of *STAR*. Selecting a category will link you to the collection of records cited in this issue pertaining to that category.

Indexes

Two indexes are available. You may use the find command under the tools menu while viewing the PDF file for direct match searching on any text string. You may also view the indexes provided, for searching on *NASA Thesaurus* subject terms and author names.

Selecting an index above will link you to that comprehensive listing.

Appendix

Select **Appendix** for important information about NASA Scientific and Technical Information (STI) Office products and services, including registration with the NASA Center for AeroSpace Information (CASI) for access to the NASA CASI TRS (Technical Report Server), and availability and pricing information for cited documents.

Typical Report Citation and Abstract

ON MICROFICHE

ACCESSION NUMBER → **N96-10751#** Sandia National Labs., Albuquerque, NM. **← CORPORATE SOURCE**

TITLE → **Minimizing phylogenetic number to find good evolutionary trees**

AUTHORS → Goldberg, Leslie Ann; Goldberg, Paul W.; Phillips, Cynthia A.; Sweedyk, Elizabeth (California Univ., Berkeley, CA.); and Warnow, Tandy (Pennsylvania Univ., Philadelphia, PA.) **← AUTHORS' AFFILIATION**

PUBLICATION DATE → 1995 26 p Presented at the 1995 Symposium on Combinatorial Pattern Matching, Helsinki, Finland, 4-7 Jul. 1995 Sponsored by California Legislative Grant

CONTRACTS/GRANTS → Contract(s)/Grant(s): (DE-AC04-94AL-85000; NSF CCR-94-57800)

REPORT NO.(S) → Report No.(s): (DE95-011893; SAND-95-0831C; CONF-9507123-1) Avail: CASI HC A03/MF A01 **← AVAILABILITY AND PRICE CODE**

ABSTRACT → Inferring phylogenetic trees is a fundamental problem in computational-biology. We present a new objective criterion, the phylogenetic number, for evaluating evolutionary trees for species defined by biomolecular sequences or other qualitative characters. The phylogenetic number of a tree T is the maximum number of times that any given character state arises in T. By contrast, the classical parsimony criterion measures the total number of times that different character states arise in T. We consider the following related problems: finding the tree with minimum phylogenetic number, and computing the phylogenetic number of a given topology in which only the leaves are labeled by species. When the number of states is bounded (as is the case for biomolecular sequence characters), we can solve the second problem in polynomial time. We can also compute a fixed-topology 2-phylogeny (when one exists) for an arbitrary number of states. This algorithm can be used to further distinguish trees that are equal under parsimony. We also consider a number of other related problems.
DOE

SUBJECT TERMS → *Algorithms; Biological Evolution; Chemical Evolution; Genetics; Molecular Biology*

AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 413)

APRIL 1996

51 LIFE SCIENCES (GENERAL)

N96-16583*# Carolinas Medical Center, Charlotte, NC. Dept. of General Surgery Research.
SLS-2 involvement Final Report
Sonnenfeld, Gerald; Apr. 1995 27 p
Contract(s)/Grant(s): (NAG2-913)
Report No.(s): (NASA-CR-199367; NAS 1.26:199367) Avail: CASI HC A03/MF A01

The purpose of this study is to support Russian space flight experiments carried out on rats flown aboard Space Shuttle Mission SLS-2. The Russian experiments were designed to determine the effects of space flight on immunological parameters. The Russian experiment included the first in-flight dissection of rodents that allowed the determination of kinetics of when space flight affected immune responses. The support given the Russians by this laboratory was to carry out assays for immunologically important cytokines that could not readily be carried out in their home laboratories. These included essays of interleukin-1, interleukin-6, interferon-gamma and possibly other cytokines.
Author
Gravitational Effects; Immune Systems; Immunology; Physiological Responses; Spaceborne Experiments;

N96-16757# SRI International Corp., Menlo Park, CA.
In vitro systems for studying metabolism of environmental chemicals in human cells Final Report, 30 Apr. 1991 - 29 Apr. 1995
Green, C. E.; 25 Jul. 1994 24 p
Contract(s)/Grant(s): (F49620-91-C-0050)
Report No.(s): (AD-A297025; LSU-2345; AFOSR- 95-0479TR) Avail: CASI HC A03/MF A01

The objective of the project is to establish and use an in vitro system of intact isolated cells from rodent and human tissues to develop quantitative data on the metabolism of toxic chemicals that can be used for risk assessments. The following halogenated aliphatic solvents are being studied: chloroform, 1,1, 1-trichloroethane, trichloroethylene, dichloromethane, bromochloromethane, and carbon tetrachloride. Chloroform is being used to establish the conditions with rat liver preparations for the generation of kinetic constants for metabolism, which are determined as disappearance- of the parent compound. Isolated hepatocytes and precision-cut liver slices are being compared to optimize the correspondence between the in vitro results obtained and the published in vivo data. The system developed with rat liver is now being applied to human liver incubations. The same set of halogenated solvents is being studied, and the resulting data should allow quantitative comparison of the metabolism and cytotoxicity in these species. These data will be analyzed to characterize interspecies differences in the kinetics of metabolism.
DTIC
Cells (biology); Culture Techniques; Metabolism; Rodents; Solvents; Tissues (biology); Toxicity;

N96-17144# Scripps Research Inst., La Jolla, CA.
Generation of novel protein receptors Final Report, 1 Dec. 1993 - 30 Nov. 1994
Hilvert, Donald; 30 Nov. 1994 4 p
Contract(s)/Grant(s): (N00014-94-1-0192)
Report No.(s): (AD-A299460) Avail: CASI HC A01/MF A01

Families of protein receptors will be created from a small, stable template. The experimental approach involves synthesizing the gene for the template protein and cloning it into a bacteriophage vector to allow phage display of the protein. In this way, replication and recognition can be coupled. Repeated rounds of mutagenesis and affinity chromatography will be employed to select the desired binding properties out of the diverse population created from the original protein scaffold.
DTIC
Bacteriophages; Chromatography; Genetic Engineering; Mutagens; Proteins; Receptors (physiology); Stability;

N96-17220# Brookhaven National Lab., Upton, NY.
Sulfur transformations in early diagenetic sediments from the Bay of Concepcion, off Chile
Vairavamurth, M. A.; Wang, Shengke; Khandelwal, B.; Manowitz, B.; Ferdelman, T.; (Max-Planck-Inst. fuer Ma-

rine Microbiology, Bremen, Germany.)and Fossing, H.; (Max-Planck-Inst. fuer Marine Microbiology, Bremen, Germany.)Apr. 1995 24 p
Contract(s)/Grant(s): (DE-AC02-76CH-00016)
Report No.(s): (DE95-016018; BNL-61964) Avail: CASI HC A03/MF A01

Despite the recognition that both organic sulfur and pyrite form during the very early stages of diagenesis, and that the amount of H2S generated in bacterial sulfate reduction primarily limits their formation, the mechanisms and the active species involved still are not clear. In this study, we quantified the major forms of sulfur distributed in sediments to assess the geochemical mechanisms involved in these transformations. XANES spectroscopy, together with elemental analysis, were used to measure sulfur specification in the organic-rich sediments from the Bay of Concepcion, Chile. Organic polysulfides constituted the major fraction of the organic sulfur, and occurred maximally just below the sediment surface (1-3 cm), where intermediates from H2S oxidation were likely to be generated most abundantly. Sulfonates, which could be formed through the reactions of sulfate and thiosulfate, also showed a sub-surface maximum in the vicinity of the 'oxic-anoxic interface'. These results strongly suggest a geochemical origin for organic polysulfides and sulfonates, and illustrate that intermediates from H2S oxidation play a dominant role in incorporating sulfur into organic matter. Pyrite was absent in the surficial layer, and first appeared just below the H2S maximum, where organic polysulfides began to decrease in abundance. From these results, we argue, that an iron monosulfide precursor formed first from reactions with H2S, and then reacts with organic polysulfides, completing the synthesis of pyrite in the sediment column.
DOE
Biogeochemistry; Chemical Analysis; Organic Materials; Pyrites; Sediments; Sulfur; Synthesis (chemistry);

N96-17276# Edgewood Research Development and Engineering Center, Aberdeen Proving Ground, MD.
Antibody-based detection of toxins of biological origin Final Report, Oct. 1992 - Sep. 1993
Menking, Darrel E.; Thompson, Roy G.; Heitz, Jonathon M.; and Anis, Nabil A.; Sep. 1995 22 p
Report No.(s): (AD-A299943; ERDEC-TR-279) Avail: CASI HC A03/MF A01

A fiber optic evanescent fluorosensor was used to detect the presence of toxins of biological origin. A direct competition assay was used for cholera toxin and staphylococcus entertoxin B, and an indirect competition assay for cholera, botulinum toxoid A and ricin. Detection of toxins for both methods was in the nanomolar range.
DTIC
Antibodies; Assaying; Fiber Optics; Fluorescence; Radiation Detectors; Toxins and Antitoxins;

N96-17308# East Carolina Univ., Greenville, NC. School of Medicine.
Evaluation of dried storage of platelets for transfusion: Physiologic integrity and hemostatic functionality Annual Report No. 3, 1 Feb. 1994 - 31 Jan. 1995
Bode, Arthur P.; Read, Majorie S.; (North Carolina Univ., Chapel Hill, NC.)and Reddick, Robert L.; (North Carolina Univ., Chapel Hill, NC.)31 Jan. 1995 23 p
Contract(s)/Grant(s): (N00014-92-J-1244)
Report No.(s): (AD-A299966) Avail: CASI HC A03/MF A01

Currently, therapeutic platelet concentrates can be stored for only 5 days. We have developed a procedure that permits long term storage of fixed and lyophilized platelets that retain hemostatic properties after rehydration. These rehydrated lyophilized platelets (RL platelets) restore hemostasis in thrombocytopenic rats and become incorporated in the hemostatic plug of bleeding time wounds of normal dogs as well as von Willebrand disease dogs with partially replenished plasma von Willebrand factor. Ultrastructurally these platelets are well preserved and are comparable to control normal washed platelets. Flow cytometry analysis shows that RL platelets react with antibodies to the major surface receptors glycoprotein (GPIlb and GPIlb/IIIa. These receptors are involved in platelet agglutination, aggregation, and adhesion. In vitro functional tests document the ability of RL platelets to adhere to denuded subendothelium and to spread to C on a foreign surface. Circulating RL platelets participated in carotid arterial thrombus formation induced in normal Carotid subjects. The participation of RL platelets in these vital hemostatic properties suggests that with further development they could become a stable platelet.
DTIC
Blood Plasma; Cytometry; Hemolysis; Hemostatics; Physiological Effects; Platelets; Thrombosis; Transfusion;

N96-17359# Edgewood Research Development and Engineering Center, Aberdeen Proving Ground, MD.
Antibody-based fiber optic evanescent wave sensor Final Report, Oct. 1990 - Sep. 1991
Menking, Darrel E.; Heitz, Jonathan M.; Thompson, Roy G.; and Thompson, Deborah G.; Sep. 1995 17 p
Report No.(s): (AD-A299937; ERDEC-TR-284) Avail: CASI HC A03/MF A01

An antibody-based fiber optic biosensor is described. This biosensor will serve as a model for future development of antibody-based detection of biological toxins. It is sensitive, specific, and new assays will be based solely on the antibody recognition element of the sensor.
DTIC
Antibodies; Bioinstrumentation; Evanescence; Fiber Optics;

N96-17408# Alabama A & M Univ., Normal, AL. Dept. of Biology.

Effects of halogenated hydrocarbon on aquatic organisms Final Technical Report

Tadros, Mahasin G.; Aug. 1995 30 p

Contract(s)/Grant(s): (F49620-91-C-0063)

Report No.(s): (AD-A299638; AFOSR-95TR) Avail: CASI HC A03/MF A01

This is report summarizes the final report of the subcontract, AFOSR F49620-91-C-0063 entitles 'Effect of Halogenated Hydrocarbons on aquatic organisms'. This research dealt with several experiments evaluating the sorption of halogenated hydrocarbons by different algae species. Three groups of algae species were tested. The sorption experiments were conducted under various conditions. With respect to changes in the growth medium composition, it was shown in this work that the silicon or nitrogen deficient medium in case of diatoms, or nitrogen or phosphate deficient medium in case of green algae or cyanobacterium could induce the higher sorption of halogenated hydrocarbons. Diatoms show better sorption than the other two groups. Low temperature had a positive influence on the sorption of halogenated hydrocarbons. In conclusion, when evaluating the sorption of halogenated hydrocarbons by algae various algal species, incubation temperature as well as growth medium composition should be considered.

DTIC

Algae; Halogenation; Hydrocarbons; Marine Biology; Organisms; Sorption;

N96-17628# ManTech Environmental Technology, Inc., Dayton, OH.

Trichloroethylene: Metabolism and other biological determinants of mouse liver tumors Final Report, Jul. 1993 - Apr. 1994

Barton, H. A.; Byczkowski, J. Z.; Channel, S. R.; Jarnot, B. M.; and Lipscomb, J. C.; Sep. 1994 79 p

Contract(s)/Grant(s): (F33615-90-C-0532)

Report No.(s): (AD-A298874; REPT-4300-94-09; AL/OE-TR-1994-0135) Avail: CASI HC A05/MF A01

Trichioroethylene (TCE) is one of the most commonly found groundwater contaminants at DOD facilities due to its widespread use in degreasing and as a solvent in other operations. Trichioroethylene has been the subject of extensive study including a large number of lifetime studies in laboratory rodents exposed by inhalation and oil gavage (oral bolus dosing). Several toxicities have been identified, including both noncarcinogenic and carcinogenic effects. This review considers both pharmacokinetic and pharmacodynamic factors that could act as determinants of TCE carcinogenesis. The implications of these data are to suggest that alternatives to the current risk assessment for TCE-induced cancer should be seriously considered.

DTIC

Biological Effects; Cancer; Carcinogens; Contaminants; Ground Water; Liver; Metabolism; Trichloroethylene; Tumors;

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Includes physiological factors; biological effects of radiation; and effects of weightlessness on man and animals.

N96-16788# Naval Health Research Center, San Diego, CA.

Neck and back strain profiles of rotary-wing female pilots Annual Report

Hodgdon, James A.; 22 Aug. 1995 13 p

Contract(s)/Grant(s): (MIPR-95MM5559)

Report No.(s): (AD-A299596) Avail: CASI HC A03/MF A01

NHRC has an integrated laboratory and field study to document neck/back fatigue profiles in female military helicopter pilots. Subsequent to a 3-hr flight mission, subjects will undergo initial neck and back strength evaluation using the MedEx. Subsequently, an 8-week neck/back strengthening program will be conducted followed by another neck/back evaluation and 3-hr flight mission. Validation of a repeated jolt impact platform at the U.S. Army Aeromedical Research Laboratory, will also be conducted to ascertain if neck/back muscles fatigue at same rate as in helicopter operations. NHRC has evaluated all equipment and software needed for in-flight monitoring of pilots using portable, miniaturized video/EMG recording systems. Initial analyses of laboratory studies indicate neck strength is greater during rotations to the left. It was observed that lumbar muscle activation is associated with neck fatigue. EMG amplitude asymmetry is evident for both cervical and lumbar paraspinals during extension and flexion suggesting there is uneven strength profiles for neck/back muscles. This asymmetry may be the basis for neck/back fatigue reported by military pilots after prolonged flights. Neck/back strengthening programs may minimize uneven strength profiles and enhance pilot performance in helicopter operations.

DTIC

Aerospace Medicine; Females; In-flight Monitoring; Military Helicopters; Muscles; Muscular Fatigue; Muscular Strength; Neck (anatomy); Physiological Tests; Pilot Performance;

N96-16824# Neurootological and Equilibriometric Society Reg., Wuerzburg (Germany).

Neurootology Newsletter Volume 1, No. 1, 1994

Trinus, Konstantin; ed. (Trinus, Konstantin, Kiev, Ukraine.) Claussen, C.-F.; ed. (Claussen, C.-F., Bad Kissingen, Germany.)and Schneider, Dieter; ed. (Schneider, Dieter, Wuerzburg, Germany.)1994 167 p (ISSN 1023-6422) Avail: CASI HC A08/MF A02

This publication is a result of the Neurootological and Equilibriometric Society's (NES) aim to include the presentation of the results of the basic science and the clinical research in neurootology, and to disseminate information regarding the knowledge of treatment of neurootological diseases. The articles appearing in this issue include 'Equilibriometric Topodiagnostics as a Basis of Modern Therapy of Vertigo and Dizziness,' 'The Neurootological History in a Vertigo Patient,' 'The Evaluation of ROMBERG's Standing Test by means of Stabilometry,' 'Modern Medical Therapy in Vertigo,' 'Metabolic Diseases with Vertigo,' 'The Italian Vestibular Rehabilitation Protocols,' 'The Cervical Electrostimulation,' 'Psychotherapy in Vertigo,' and 'European Medico-legal Aspects of Vertigo.'
CASI
Clinical Medicine; Neurology; Otology; Psychotherapy;

N96-16827# Civil Aeromedical Inst., Oklahoma City, OK.
Role of metabolites in aviation forensic toxicology Final Report
Chaturvedi, Arvind K.; and Canfield, Dennis V.; Aug. 1995 8 p
Report No.(s): (DOT/FAA/AM-95/26) Avail: CASI HC A02/MF A01

In aviation accident investigations, specimens from fatal aircraft victims are analyzed for drugs. Their presence indicates exposure to drugs and suggests possible associated medical conditions for which they might have been taken. As drugs are mostly present in therapeutic to subtherapeutic levels in aviation forensic toxicology cases, determination of parent drugs and their metabolites in multispecimens is of significance. Although chemically reactive metabolites are difficult to detect, physiologically active and inactive metabolites can be analyzed. Selective and sensitive techniques are available, but unavailability of metabolite reference standards, endogenous substance interference, and low tissue metabolite levels limit the analyses. However, the majority of primary metabolites can be effectively characterized/quantitated. Demonstrating the presence of drug (e.g., terfenadine, cocaine, THC) metabolites provides a compelling evidence for exposure to the parent drug and facilitates interpretation of results, particularly when the metabolites are active. Such analyses are not as helpful if the metabolites are also available as drugs (e.g., diazepam, temazepam, oxazepam).
Author
Aircraft Accident Investigation; Aircraft Accidents; Drugs; Metabolites; Toxicology;

N96-16845# Army Aeromedical Research Lab., Fort Rucker, AL.
US Army Aviation Epidemiology Data Register: Incidence and age-specific rates of herniated nucleus among US Army aviators, 1987-1992 Final Report
Mason, Kevin T.; Harper, Jennifer P.; and Shannon, Samuel G.; Aug. 1995 18 p
Contract(s)/Grant(s): (DA PROJ. 301-62787-A-878)
Report No.(s): (AD-A299586; USAARL-95-33) Avail: CASI HC A03/MF A01

The U.S. Army Aviation Epidemiology Data Register (AEDR) was queried for listings of Army aviators with the finding of herniated nucleus pulposus (HNP) for the 6-year period of 1987 to 1992. This study tabulated the incidence, age-specific annual rates of HNP, and the distribution of aeromedical dispositions for aircrew with HNP. The U.S. Army aviation medicine community can expect an annual incidence rate about 1 case of HNP per 1,000 aviators years. However, the incidence rate is increasing. Aviators about age 40 were at the greatest risk. About 7.4 percent of the aviators with HNP were removed permanently from Army flying duties due to HNP complications.
DTIC
Aerospace Medicine; Age Factor; Aircraft Pilots; Epidemiology;

N96-16850# Japanese Air Self-Defense Force, Tokyo (Japan). Aeromedical Lab.
The Reports of Aeromedical Laboratory Volume 35, No.4
6 Dec. 1994 43 p (ISSN 0023-2858) Avail: CASI HC A03/MF A01

English abstracts are provided for the following: Effects of Audio and Visual Stimuli on Postrotatory Nystagmus and Spatial Orientation; Acceleration Atelectasis in Aviators of Aircraft with OBOGS (T-4); and Aviation Fuel Exposure among Distribution Personnel in a JASDF Base. For individual titles, see N96-16851 through N96-16853.
Aerospace Medicine; Aircraft Fuels; Atelectasis; Auditory Perception; Biological Effects; Flight Stress; Human Tolerances; Nystagmus; Physiological Effects; Visual Perception;

N96-16851# Japanese Air Self-Defense Force, Tokyo (Japan).
Effects of audio and visual stimuli on postrotatory nystagmus and spatial orientation c52
Nitami, Noriko; Utsuki, Narisuke; Takeuchi, Yoshinori; and Osada, Hiroshi; In its The Reports of Aeromedical Laboratory Volume 35, No. 4 6 Dec. 1994 p 77-87 (For primary document see N96-16850 04-52) Avail: CASI HC A03/MF A01

Effects of audio and visual stimuli on postrotatory nystagmus and spatial orientation were studied. Each of nine subjects was seated on a chair which was rotated to the right at the speed of 45 degrees/sec (two minute rotation) or 90 degrees/sec (one minute rotation) in a darkroom. The lateral EOG activities were recorded through telemetering devices. Audio stimulus (1960 Hz sq wave, 60 dBA at subject's ear position) or visual stimulus (red LED, 20 cd/sq m) were pre-

sented for one second from either 15 degrees left or right from the center, eight seconds after rotation was stopped. The faster rotation caused the more frequent postrotatory nystagmus. The postrotatory nystagmus was effectively suppressed by the audio and visual stimuli; though visual stimulus suppressed nystagmus more powerfully. Perception of stimulus direction for audio stimulus was more accurate than for visual stimulus, and less affected by the rotatory stimulus. Orientation for visual stimulus significantly shifted to the opposite direction of rotation. The results indicate that auditory spatial orientation aid will serve for pilots to protect themselves from spatial disorientation.

Author

Auditory Perception; Disorientation; Nystagmus; Physiological Effects; Rotation; Visual Perception; Visual Stimuli;

N96-16852# Japanese Air Self-Defense Force, Tokyo (Japan).

Acceleration atelectasis in aviators of aircraft with OBOGS (T-4) c52

Kikukawa, Azusa; Matsuda, Hirokazu; (Japanese Air Self Defense Force, Hamamatsu AFB, Japan.)and Sugiyama, Keisaku; In its The Reports of Aeromedical Laboratory Volume 35, No. 4 6 Dec. 1994 p 89-97 In JAPANESE (For primary document see N96-16850 04-52) Avail: CASI HC A02/MF A01

Aviators of high performance aircraft are exposed to various kinds of physical stress. Recently, aviators of new training jet aircraft (T-4) complained of chest discomfort or inability to take deep breath immediately after flight. The aircraft is the first Japan Air Self Defense Force (JASDF) jet that supplies aviators' oxygen by onboard oxygen generation system (OBOGS) which means molecular sieve enriched air system. Field study disclosed reduced vital capacity (VC) just after flight. Chest roentgenogram showed elevated diaphragm or several disks above diaphragm. These phenomena were prominent in aged aviators, after high-G (greater than 5 G) mission and after high altitude flight (greater than 15,000 feet). Additional study in Aeromedical Laboratory showed that neither high altitude chamber flight instructors inspiring pure oxygen nor centrifuge acceleration trainees inspiring room air decreased their VC. Accumulated JASDF aviators' data of annual medical examination denied any kind of physical impairment of the aviators of T-4. The T-4 aviators' phenomena were compatible with acceleration (absorption) atelectasis which is caused by Gz stress with hyperoxygenation. OBOGS was originally invented device to reduce the concentration of aviators' inspiring oxygen to avoid the adverse effect of pure oxygen, but its dilution does not seem to be enough. To reduce the source of aviators' stress, the present countermeasures would be the anti-G straining maneuver and stopping smoking until we adopt positive pressure breathing.

Author

Aerospace Medicine; Aircraft Pilots; Altitude Simulation; Atelectasis; Oxygen; Physiological Effects; Pressure Breathing;

N96-16853# Japanese Air Self-Defense Force, Tokyo (Japan).

Aviation fuel exposure among distribution personnel in a JASDF base c52

Kobayashi, Asao; Kikukawa, Azusa; and Miyamoto, Yoshinori; In its The Reports of Aeromedical Laboratory Volume 35, No. 4 6 Dec. 1994 p 99-109 (For primary document see N96-16850 04-52) Avail: CASI HC A03/MF A01

Aviation fuel exposures were assessed among 7 personnel in the Japan Air Self Defense Force. Three personnel were engaged in distributing aviation fuel (JP-4 jet fuel and aviation gasoline 100/130 containing tetraethyl lead). The time weighted average air exposure to organic solvents in fuel (toluene, ethyl benzene, n-hexane, n-heptane, n-octane, and n-nonane) was less than 1% of the threshold limit value of the American Conference of Governmental Industrial Hygienists (ACGIH). Urinary levels of hippuric acids, 2,5-hexanediones and delta-eminolevulinic acids were below the low exposure limit values of Japanese regulation. Urinary hippuric acids were higher in distribution personnel than in nondistribution personnel. The urinary hippuric acid may be a biological indicator of occupational exposure to the aviation fuel.

Author

Exposure; Human Tolerances; Jp-4 Jet Fuel; Physiological Effects;

N96-17139# Federation of American Societies for Experimental Biology, Bethesda, MD.

Biology, chemistry and modelling of vision

Masland, Richard; 2 Nov. 1994 17 p

Contract(s)/Grant(s): (N00014-94-1-0701)

Report No.(s): (AD-A299451) Avail: CASI HC A03/MF A01

This year's vision conference had 38 invited speakers. Sessions concentrated on: (1) Retinal Cell Populations, (2) Mechanisms of Synaptic Communication, (3)Mechanisms of Lateral Conduction, (4) Parallel Information Flows, (5) Primate Color vision, (6) Retina-based Hardware, (7) Bipolar Cell Axon Terminals, and (8) The Control of Ganglion Cell Excitation. The meeting was enlivened by several important break-throughs and interesting controversies. There was an excellent paper by Dr. Enrica Strettol on the organization of the inner retina. She has found a way to determine finally the densities of the different retinal cell sub-populations. Elio Raviola presented exciting new methods combining molecular biology and anatomy for the study of

cell populations. An exciting session organized by Denis Baylor had three presentations on the use of multi-electrode arrays for analyzing the retinal output. The technical part (using multi-electrode arrays) is now solved. The excitement lies in trying to decode the message sent to the brain. Markus Meister gave a particularly stimulating talk, in which he proposed that the action of amacrine cells is indirectly communicated to the brain via the cross-correlation between neighboring retinal ganglion cells.
DTIC
Bipolarity; Conferences; Eye (anatomy); Information Flow; Molecular Biology; Vision;

N96-17170# Oak Ridge National Lab., TN.
Indoor air and human health revisited: A recent IAQ symposium
Gammage, R. B.; 1994 6 p Presented at the International Workshop on Indoor Air: An Integrated Approach, Gold Coast, Australia, 27 Nov. - 1 Dec. 1994
Contract(s)/Grant(s): (DE-AC05-84OR-21400)
Report No.(s): (DE95-016363; CONF- 941139-3) Avail: CASI HC A02/MF A01

Indoor Air and Human Health Revisited was a speciality symposium examining the scientific underpinnings of sensory and sensitivity effects, allergy and respiratory disease, neurotoxicity and cancer. An organizing committee selected four persons to chain the sessions and invite experts to give state-of-the-art presentations that will be published as a book. A summary of the presentations is made and some critical issues identified.
DOE
Allergic Diseases; Carcinogens; Indoor Air Pollution; Public Health; Respiratory Diseases;

N96-17267# Tennessee Univ., Memphis, TN. Dept. of Anatomy and Neurobiology.
Somatosensory responsiveness in behaving monkeys and human subjects Final Report, 1 Jul. 1994 - 30 Jun. 1995
Nelson, Randall J.; 16 Aug. 1995 31 p
Contract(s)/Grant(s): (AF-AFOSR-0333-91)
Report No.(s): (AD-A299724; AFOSR-95-0549TR) Avail: CASI HC A03/MF A01

Several research goals were accomplished during the four years of this grant. We found that the responsiveness of primary somatosensory (SI) cortical neurons is 'unattenuated' if when behavioral conditions become unpredictable and that SI neurons responding to sensory cues for wrist movement with the greatest fidelity have their activity modulated just prior to movement onset. These observations fits with the hypotheses that during predictable and stereotyped behaviors, neuronal responsiveness is gated so that the central nervous system (CNS) may partially engage in other activities and that sensory inputs that are no longer behaviorally relevant are gated so as not to interfere with monitoring movement parameters by the primate CNS. We also found that human subjects can improve in their ability to perform simple motor tasks and that the improvement can be modeled to predict which subject will eventually be good performers after only a few days of training. Moreover, the initiation of intended movements can be interrupted by tactile abort signals given prior to movement execution if these signals are given in the proper manner.
DTIC
Cerebral Cortex; Neurons; Neurophysiology; Psychosomatics; Sensory Perception;

N96-17272# California Univ., San Diego, La Jolla, CA.
Current issues in blood substitute research and development-1995 Final Report, 30 Mar. 1995 - 30 Sep. 1995
Winslow, Robert M.; 1 Sep. 1995 218 p
Contract(s)/Grant(s): (DAMD17-95-2-5003)
Report No.(s): (AD-A299748) Avail: CASI HC A10/MF A03

Although a substitute for human red cells has been sought for more than a century, still no product is available to patients. Until the early 1980s, research and development in this area was relegated to rather obscure academic efforts, but AIDS suddenly brought new focus to the effort when its transmission by blood transfusion was shown clearly. Although blood is now extensively tested for the AIDS (HIV) virus, research on red cell substitutes has shown tremendous potential application for these products, and development continues at an unprecedented pace. In fact, a number of products are currently in human clinical trials. This collection of essays covers the following topics: transfusion alternatives - impact on blood banking worldwide; demonstration of the efficacy of a therapeutic agent; a physiologic basis for the transfusion trigger; combat casualties, blood, and red blood cell substitutes - a military perspective; clinical development of perfluorocarbon-based emulsions as red cell substitutes; design of chemically modified and recombinant hemoglobins as potential red cell substitutes; encapsulation of hemoglobin in liposomes; stability and toxicity of hemoglobin solutions; red cell substitutes in the kidney; a theoretical analysis of oxygen transport - a new strategy for the design of hemoglobin-based red cell substitutes; microcirculatory consequences of blood substitution with alpha alpha-hemoglobin; oxygen delivery regulation - implications for blood substitutes; and tumor oxygenation and radiosensitivity.
DTIC
Blood; Erythrocytes; Hemoglobin; Oxygen Metabolism; Substitutes; Transfusion;

N96-17277# California Inst. of Tech., Pasadena, CA. Div. of Biology.
Toward a neurobiological theory of visual attention Final Report, 1 Sep. 1992 - 31 Aug. 1995
Koch, Christoff; 1995 12 p

Contract(s)/Grant(s): (F49620-92-J-0454)
Report No.(s): (AD-A299945; AFOSR-95-0656TR) Avail: CASI HC A03/MF A01

The purpose of this effort was to study visual, focal selective attention and its implementation in the primate visual system from a computational point of view. It is know that at the neuronal level, two cortical pathways exists that are responsible for mediating attention: the where pathway that selects interesting or conspicuous locations and the what pathway that identifies and recognizes objects. In the effort, it was shown how neuronal networks based on those found in the cerebral cortex can implemented these pathways using real images. In particular, the use of a saliency map, that encodes how 'interesting' or 'salient' locations are in the visual field (rather than what features are present at these locations) represents a powerful strategy to aid visual search.These algorithms are being ported onto Pentium-based machines for various machine-vision applications.
DTIC
Cerebral Cortex; Computerized Simulation; Neurons; Neurophysiology; Primates; Visual Fields; Visual Perception;

N96-17278# Stanford Univ., CA. Dept. of Applied Mechanics.
Biomimicking: Electro-elastic structural speciality in auditory receptor cells Final Report, 15 May 1992 -14 May 1995
Steele, Charles R.; 16 Sep. 1995 3 p
Contract(s)/Grant(s): (F49620-92-J-0276)
Report No.(s): (AD-A299948; SPO-10248; AFOSR-95-0657TR) Avail: CASI HC A01/MF A01

A recent discovery is that certain receptor cells in the cochlea in the inner ear undergo displacement due to an electric field, for frequencies as high as 25 kHz in the guinea pig. In the hearing process, these cells are likely to provide the important feedback mechanism for the enhancement of low amplitude sound. Part is due to the unique microstructural design of the wall of the cell, consisting of a passive elastic cytoskeleton and an isotropic piezoelectric membrane. Using measurements from several laboratories permitted the calculation of the orthotropic piezoelectric properties of the wall. With our measurements, the elastic moduli of the protein components in the cytoskeleton were determined Computations of the dynamic response of the whole cell containing and immersed a viscous fluid agree fairly well with experiments. Despite the small cell size, small in comparison with the viscous boundary layer, the orthotropic design permits the cell to delivery significant force with low electric signal at auditory frequencies. Possible application of the design to devices is being pursued.
DTIC
Auditory Perception; Bioacoustics; Cell Membranes (biology); Cells (biology); Cochlea; Dynamic Response; Electric Power; Hearing; Modulus of Elasticity; Structures;

N96-17291# Naval Undersea Warfare Center, Newport, RI.
A compilation of geometric distance and tissue property data for the human thorax Final Report
Norton, Cathy A.; 28 Aug. 1995 26 p
Report No.(s): (AD-A299986; NUWC-NPT-TD-11037) Avail: CASI HC A03/MF A01

This document is a collection of information from the scientific literature that is relevant to the modeling of sound transmission in the human thorax. It contains data on geometric distances from points on the chest wall to the sites of sound generation within the heart and coronary arteries. The spectral content of the sound is also discussed. The types and thicknesses of tissues along the direct path for sound transmission are identified and a description of the viscoelastic tissue properties of the thorax is provided.
DTIC
Coronary Circulation; Distance; Sound Transmission; Thorax; Tissues (biology);

N96-17311# Maryland Univ., College Park, MD. Dept. of Electrical Engineering.
Theoretical and experimental studies of auditory processing Final Progress Report, 1 Sep. 1992 - 31 Aug. 1995
Shamma, S.; and Krishnaprasad, P. S.; Aug. 1995 19 p
Contract(s)/Grant(s): (F49620-92-J-0500)
Report No.(s): (AD-A299662; AFOSR-95-0658TR) Avail: CASI HC A03/MF A01

The research reported here has been conducted over the last three years under the AFOSR grant F49620-92-J-0500. It is divided into four general categories of projects: (1) VLSI implementations of the early auditory stages, (2) functional organization of the auditory cortex: neurophysiology, (3) functional models of the auditory system: psychoacoustics, and (4) analysis of neural network architectures with wavelet transforms. We shall review briefly the main results achieved in these four areas.
DTIC
Auditory Signals; Neural Nets; Neurophysiology; Psychoacoustics; Signal Processing; Very Large Scale Integration;

N96-17438# Japanese Air Self-Defense Force, Tokyo (Japan). Aeromedical Lab.
The Reports of Aeromedical Laboratory Volume 36, No. 1
Mar. 1995 25 p In JAPANESE (ISSN 0023-2858) Avail: CASI HC A03/MF A01

The following papers are included: An Effect of Loudness of Advisory Speech on a Choice Response Task; The Balance of the Respiration Amplitude between Inspiration and Expiration in a Simulation Flight -- Respiration Conver-

gence as an Index of Workload; and Proceedings of the 318th Meeting in Aeromedical Lab JASDF. For individual titles, see N96-17439 through N96-17440.
Aerospace Medicine; Aircraft Pilots; Decision Making; Loudness; Psychoacoustics; Respiration; Respiratory Physiology; Verbal Communication; Workloads (psychophysiology);

N96-17440# Japanese Air Self-Defense Force, Tokyo (Japan).
The balance of the respiration amplitude between inspiration and expiration in a simulation flight: Respiration convergence as an index of workload c52
Takeuchi, Yoshinori; In its The Reports of Aeromedical Laboratory Volume 36, No. 1 Mar. 1995 p 9-15 In JAPANESE (For primary document see N96-17438 04-52) Avail: CASI HC A02/MF A01

Respiration curves in flight simulation were analyzed to estimate pilots' workload. Six Japan Air Self Defense Force (JASDF) pilots (aged 23 or 24 years old) performed 15 flight maneuvers which varied in difficulty. The flight simulator used was modeled after a JASDF T-2 jet trainer. There was no motion system, and the pilots did not experience any specific physical stress. The inspiration amplitude and expiration amplitude were added up separately, and when both total volumes became equal it was called 'converged.' An average number of breath for convergence was 1.90 cycles, and 90.0% of the breath was converged within three cycles at rest. This shows that the subjects breathed very regularly during this period. The average breath cycles to converge was 2.82 times in flight. An average time to the convergence was 7.87 sec at rest and 9.14 sec in flight. The results indicate that the balance between inspiration volume and expiration volume was restored in a relatively short period even when respiration curves look quite irregular in mental work. The correlation coefficient was 0.26 between the subjective estimation of difficulty of the flight maneuver and the breath rate. The respiration rate, which has been used frequently as a respiration measurement, is not regarded as a good parameter because pilots breathe in high frequency in every acrobatic flight task. On the other hand, the correlation coefficient was 0.74 between the subjective estimation of difficulty and the average of the breath numbers to converge. This means that the more difficult the flight maneuver goes, the more irregular the respiration curve comes up. The breath number to converge was one of the good indices to measure mental workload.
Author
Aerospace Medicine; Aircraft Pilots; Biometrics; Flight Simulation; Respiration; Respiratory Physiology; Workloads (psychophysiology);

N96-17647 Helsinki Univ. of Technology, Espoo (Finland). Low Temperature Lab.
Whole-head neuromagnetic characterization of human somatomotor cortical functions Thesis
Forss, N.; 1995 139 p
Report No.(s): (PB95-266862; ISBN-951-22-2682-0) Copyright Avail: Issuing Activity (National Technical Information Service (NTIS))

The aim of this study was to characterize functional organization of the human somatomotor areas by identifying cortical sites that participate in tactile information processing and generation of movement, and to study their temporal behavior and functional roles. In addition to healthy volunteers, two patients with partial epilepsy were included to show the ability of whole-head MEG recordings in locating epileptic discharges in somatomotor regions.
NTIS
Central Nervous System; Epilepsy; Physiological Responses; Physiological Tests;

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N96-16658# NTI, Inc., Dayton, OH.
The effect of alcohol and fatigue on an FAA readiness-to-perform test Final Report
Aug. 1995 67 p
Contract(s)/Grant(s): (DTFA01-93-C-00004)
Report No.(s): (DOT/FAA/AM-95/24) Avail: CASI HC A04/MF A01

Readiness-to-perform (RTP) testing is considered by some to be a broad-based alternative or supplement to biochemical testing for drugs and alcohol. Since it is also thought to detect impairment due to other sources (e.g., fatigue, illness, depression), the Federal Aviation Administration (FAA) is interested in exploring its scientific validity and practical utility. This study defined the statistical sensitivity and individual diagnosticity of an RTP test utilizing the NovaScan(TM) paradigm. 77 male subjects within 3 age groupings (25-34, 40-48, and 54-62) were administered alcohol sufficient to raise their breath alcohol content (BrAC) to .08 percent BrAC. FAA-NovaScan testing occurred once each hour as their BrAC levels rose to .08 percent and diminished back to baseline levels. The double-blind design involved having alcohol drinks and 'sham' alcohol drinks administered in a counter-balanced order on 2 separate days. An estimate of the 'reliability' of the test once it reached plateau levels indicated that most reaction time variables had a reliability between .76 and .94, with some percent correct measures showing too little variability to calculate meaningful reliabilities. Multivariate and univariate analyses of variance were conducted to determine whether the test was sen-

sitive to various levels of BrAC. Ingestion of alcohol produced statistically significant effects on RTP test performance. Reaction time measures on all 3 tasks in the FAA-RTP test showed statistically significant decrements during the alcohol ingestion phase of the alcohol day that were monotonically related to BrAC level while BrAC was increasing. When BrAC was decreasing, alcohol-induced decrements were generally more severe, and were not monotonically related to the BrAC levels in all cases. A task requiring repetitive attention appeared most sensitive to alcohol concentration, followed by a task requiring mental rotation and memory. A visual search and memory task, although not as effective in detecting alcohol levels, showed some significant effects, apparently contributing to the efficiency of the entire test. Candidate scoring algorithms were developed to determine whether the test could have detected individuals at each BrAC level. When cut-off points of 2.0 standard deviations were used on several test variables, the procedure would have detected 97 percent of the subjects at .08 percent BrAC, 88 percent at .06 percent BrAC, and 76 percent at .04 percent BrAC. With this criterion, 30 percent of the subjects would also have 'failed' the test, even with no alcohol in their system. Inspection of results on the placebo day revealed that when the test was administered twice, as it would in actual implementation, this false positive rate was reduced to 24 percent. It is concluded that the FAA-RTP test is sensitive in detecting performance decrements due to the generally accepted levels of legal alcohol intoxication. As such, it shows promise as a non-invasive screening procedure.

Author (revised)

Diagnosis; Drugs; Fatigue (biology); Human Performance; Intoxication; Mental Performance;

N96-16810# Illinois Univ., Savoy, IL.

Perceptual learning in the acquisition of flight skills Final Report, Aug. 1986 - May 1992

Lintern, Gavan; Sep. 1995 21 p

Contract(s)/Grant(s): (MDA903-86-C-0169)

Report No.(s): (AD-A299520; ARI-RN-95-47) Avail: CASI HC A03/MF A01

Many skills transfer effects observed in flight training research may be explained by an appeal to invariant perceptual properties of the task environment. If training in a simulator serves to enhance sensitivity to perceptual properties that are critical to flight performance, a high level of transfer will result. The theory forwarded here assumes that a relatively low-dimensional set of properties supports flight control. It is those properties that need not be represented accurately, or even at all. One implication of the approach outlined here is that the unquestioning pursuit of high fidelity is, in large part, wasted effort.

DTIC

Flight Simulators; Flight Training; Human Factors Engineering; Psychomotor Performance;

N96-16870# Washington Univ., Saint Louis, MO. Dept. of Psychology.

The relationship among eye movements, head movements, and manual responses in a simulated air traffic control task Final Report

Boyer, Donna Jean; Aug. 1995 18 p

Contract(s)/Grant(s): (DTFA02-91-C-91056)

Report No.(s): (DOT/FAA/AM-95/23) Avail: CASI HC A03/MF A01

Performance of operators in aviation systems is highly dependent on their ability to visually scan information sources, identify problematic situations, and respond appropriately. Scanning behavior has often been mentioned as a contributing factor in the performance of air traffic controllers. An investigation was initiated to identify how alterations in various gaze measures could serve as indices of changes in alertness. As part of that larger investigation, a subset of the complete data base was used to investigate the nature of changes in eye and head movements within a session, between days, and among event types. Ten subjects were chosen for their propensity to make head movements when shifting gaze from the CRT display to the keypad for a manual response. The task consisted of 44 infrequently occurring events for which manual responses were required. There were four types of events: unidentified aircraft, loss of altitude, conflict (two aircraft at the same altitude flying toward each other), and no conflict (two aircraft at the same altitude flying away from each other). The two-hour session was divided into three approximately equal time blocks. The dependent measures were: eye movement latency, head movement latency, and the eye movement following the manual response that returned the eye to the visual display (return saccades). Eye and head movement latencies were measured from the manual response. The following conclusions were made: There were no significant eye-head movement differences among the event types. The relationship between the initiation of head movements and the initiation of eye movements appears to be a stable characteristic of the individual; it was consistent between days, as well as within the session. Return saccades were task dependent; events requiring two manual responses showed different return saccade patterns. The return saccade associated with the first response occurred prior to making the manual response, whereas the return saccade associated with the second response occurred after the manual response.

Author

Air Traffic Controllers (personnel); Alertness; Head Movement; Operator Performance; Reaction Time; Saccadic Eye Movements; Visual Tasks;

N96-17285# Army Research Inst. for the Behavioral and Social Sciences, Alexandria, VA.

Evidence for an interpersonal knowledge factor: The reliability and factor structure of tests of interpersonal knowledge and general cognitive ability Final Report, Aug. 1993 - Jun. 1995

Legree, Peter J.; and Grafton, Frances C.; Sep. 1995 51 p

Report No.(s): (AD-A299659; ARI-TR-1030) Avail: CASI HC A04/MF A01

Many aptitude scales measure general or academic knowledge and utilize a forced choice response format in which answers are scored as either correct or incorrect. In contrast to this traditional scoring procedure, quantifying performance on scales developed to measure interpersonal skills requires the opinions of multiple experts, and individual responses cannot be easily or unambiguously evaluated. Given this type of uncertain knowledge domain, a Likert procedure was modified to measure expertise based on the distance between expert and subject ratings of the relative strengths of a set of probabilistic relationships. In Phase 1, data were collected and indicate that an improvement in the reliability of an existing measure of leadership could be traditional forced choice format. In Phase 2, data were collected with the leadership scale and two additional interpersonal knowledge scales using Air Force recruits for whom Armed Services Vocational Aptitude Battery (ASVAB) data were available. Confirmatory factor analyses indicate that the factor structure of the 13-test battery (ASVAB plus the experimental scales) could be best explained by hypothesizing the existence of a separate interpersonal knowledge factor in addition to the four factors that are typically extracted from the ASVAB. These results demonstrate (1) the applicability of the Likert response format to efficiently measure individual differences in nontraditional knowledge domains such as interpersonal skills, and (2) the existence of a separate first-order factor that is labeled Interpersonal Knowledge.

DTIC

Cognition; Cognitive Psychology; Factor Analysis; Human Performance; Mental Performance; Personnel Selection;

N96-17288# California Univ., Irvine, CA. Center for the Neurobiology of Learning and Memory.

Synaptic plasticity and memory formation Final Technical Report, 1 Jun. 1992 - 31 May 1995

Lynch, Gary; 1 Sep. 1995 11 p

Contract(s)/Grant(s): (F49620-92-J-0307)

Report No.(s): (AD-A299753; AFOSR-95-0559TR) Avail: CASI HC A03/MF A01

Long-term potentiation (LTP) is widely regarded as a substrate for commonplace varieties of memory. This work was intended to describe the cellular mechanisms responsible for the expression and stabilization of LTP. Three quite different lines of evidence (pharmacological, molecular, and biophysical) point to the conclusion that the potentiation effect is due to a change in the properties of post-synaptic transmitter receptors at glutamatergic synapses (AMPA receptors). Computer modeling studies indicate that a simple increase in the opening/closing rates of the receptors can explain LTP. Biochemical studies identified two LTP-related events that would promote the reorganization of the synaptic zone: (1) activation of an intracellular protease (calpain) that cleaves essential proteins in the synaptic cytoskeleton and (2) a transient modification of adhesion molecules that results in the cleavage of their intracellular domains. Related work defined novel integrin-like adhesion receptors that appear to be needed for the stabilization of the potentiated state. AFOSR funded work also led to the synthesis of a new class of drugs ('ampakines') that 'up-regulate' AMPA receptors; these compounds are the first to freely cross the blood-brain barrier and enhance excitatory transmission and LTP induction in behaving animals. 'Ampakines' promote memory encoding in a variety of experimental paradigms without affecting performance variables. The drugs also reverse age-associated memory impairments in middle-aged rats; they are now being tested in young and elderly human subjects.

Author

Biochemistry; Cytology; Drugs; Memory; Neurophysiology; Neurotransmitters; Receptors (physiology); Synapses;

N96-17315# Michigan Univ., Ann Arbor, MI. Div. of Research Development and Administration.

Adaptive executive control: Flexible human multiple-task performance without pervasive immutable response-selection bottlenecks Interim Report, 1 Jan. 1992 - 1 Jun. 1995

Meyer, David E.; Kieras, David E.; Lauber, Erick; Schumacher, Eric H.; and Glass, Jennifer; 1 Jun. 1995 38 p

Contract(s)/Grant(s): (N00014-92-J-1173)

Report No.(s): (AD-A299695; DRDA-TR-95-ONR-EPIC- 3) Avail: CASI HC A03/MF A01

A new theoretical framework, the EPIC (Executive-Process/Interactive-Control) architecture, provides the basis for accurate detailed computational models of human multiple-task performance. Contrary to the traditional response-selection bottleneck hypothesis, EPIC's cognitive processor can select responses and do other procedural operations simultaneously for multiple concurrent tasks. Using this capacity together with flexible executive control of peripheral perceptual - motor components, EPIC computational models account well for various patterns of mean reaction times, systematic. individual differences in multiple-task performance, and influences of special training on people's task-coordination strategies. These diverse phenomena, and EPIC's success at modeling them, raise strong doubts about the existence of a pervasive immutable response-selection bottleneck in the human information-processing system.

The present research therefore helps further characterize the nature of discrete versus continuous information processing.

DTIC
Adaptive Control; Artificial Intelligence; Cognition; Control Systems Design; Decision Making; Human Performance; Information Processing (biology); Machine Learning; Mathematical Models; Perception; Stochastic Processes;

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing. For related information see also 16 Space Transportation.

N96-16790# Naval Health Research Center, San Diego, CA.
Countermeasures to heat stress in females Annual Report, 30 Jan. - 1 Aug. 1995
Hodgdon, James A.; 22 Aug. 1995 14 p
Contract(s)/Grant(s): (MIPR-95MM5596)
Report No.(s): (AD-A299604) Avail: CASI HC A03/MF A01

High-heat environments impair work performance and can compromise combat mission success. Lack of heat dissipation poses a serious problem to personnel who perform work in noxious environments. To decrease the incidence of heat injury and increase performance capability, microcooling technologies have been developed for personnel working in encapsulated garments. Currently, the effectiveness of microclimate cooling systems (MCS) for females has not been determined. Due to gender differences in thermoregulation and anthropometry, some MCS may confer a greater advantage in women. In the proposed study, cooling will be provided with a whole-body water-cooled system, a vest air-cooled system, and a vest phase-change material system. The proposed study will determine the effectiveness of microclimate cooling as a countermeasure to heat stress for females.
DTIC
Cooling Systems; Countermeasures; Females; Heat Tolerance; Hyperthermia; Microclimatology; Stress (physiology); Temperature Effects; Thermal Protection; Thermoregulation;

N96-17135# Conrad Technologies, Inc., King of Prussia, PA.
Development of injury preventing helmet servo-support system for high performance aircraft
Decleene, Donald F.; Oct. 1994 6 p
Contract(s)/Grant(s): (N00014-94-C-0179)
Report No.(s): (AD-A299444) Avail: CASI HC A02/MF A01

The objective of this task is to identify and establish values and/or limits for all system parameters that must be satisfied in the embodiment of the support system or that serve as factors in the development of a more reliable or optimal system. This specific information is required to ensure that project effort is properly directed toward the development of a system that will meet the overall technical objective of the program.
DTIC
Flight Clothing; Helmets; Support Systems;

N96-17234# Los Alamos National Lab., NM.
Lessons learned from occurrences involving procedures at Los Alamos National Laboratory in 1994
Frostenson, C. K.; 1995 6 p Presented at the Human Factors and Ergonomics Society Meeting, San Diego, CA, 9-13 Oct. 1995
Contract(s)/Grant(s): (W-7405-ENG-36)
Report No.(s): (DE95-015301; LA-UR-95-2084; CONF-951092-3) Avail: CASI HC A02/MF A01

This study used the Department of Energy (DOE) Occurrence Reporting and Processing System (ORPS) data to investigate occurrences reported during one year at Los Alamos National Laboratory (LANL). ORPS provides a centralized database and computerized support for the Collection, distribution, updating, analysis, and validation of information in occurrence reports about abnormal events related to facility operation. Human factors causes for occurrences are not always defined in ORPS. Content analysis of narrative data revealed that 33% of all LANL 1994 adverse operational events have human factors causes related to procedures. Procedure-caused occurrences that resulted in injury to workers, damage to facilities or equipment, or a near-miss are analyzed.
DOE
Data Bases; Human Factors Engineering; Personnel; Research Facilities; Safety Management;

N96-17279# Federal Aviation Administration, Atlantic City, NJ. Technical Center.
Flight simulator evaluation of baseline crew performance with three data link interfaces Technical Note
Rehmann, Albert J.; Vangent, R. N.; Bohnen, H. G.; and Jorna, P. G.; Sep. 1995 53 p
Report No.(s): (AD-A299949; DOT/FAA/CT-TN95/19) Avail: CASI HC A04/MF A01

This study was conducted by the National Laboratory for Research of the Netherlands under cooperative sponsorship by the Federal Aviation Administration (FAA), and the Ministry of Transport of the Netherlands. The purpose of the study was the evaluation and measure of fundamental level of effort associated with the use of Data Link as a communications medium. Three Data Link interface designs were

evaluated which combined effects of location, operability, size, and level of integration with the cockpit. The scenario was an oceanic flight of 2 hours duration, from a point over the North Atlantic, across the British Isles to a landing at Sciphol Airport, Amsterdam. Experimental conditions included routine flight and diversions in the flight due to oceanic storms and turbulence, enroute traffic conflicts, and airport runway closings. Data measures included subjective assessments of display usefulness, workload, and overall acceptability of Data Link compared to voice and objective measures of level of effort, and errors. In addition, physiological measures of heartrate, respiration, and head position were logged, and correlated with events of the flight. Overall, Data Link was rated acceptable in certain flight regimes, and unacceptable in others. Where excessive key entries were required, the Data Link function was rated lower than voice, and where automation alleviated the need for excessive keying, Data Link was rated about the same as voice.
DTIC
Computer Systems Design; Data Links; Display Devices; Flight Simulators; Human Factors Engineering; Human Performance; Human-computer Interface; Navigation Aids; Netherlands; Workloads (psychophysiology);

N96-17389# Army Research Lab., Aberdeen Proving Ground, MD.
Human engineering design guidelines for a powered, full body exoskeleton Final Report
Crowell, III, Harrison P.; Jul. 1995 33 p
Contract(s)/Grant(s): (DA PROJ. 1L1-62716-AH-70)
Report No.(s): (AD-A299539; ARL-TN-60) Avail: CASI HC A03/MF A01

This report presents human engineering design guidelines for the development of exoskeletons, which can help the Army do its job faster, safer, with fewer people, and at lower cost by augmenting and enhancing the capabilities of individual soldiers. Descriptions of exoskeletons, which have been developed or attempted, are included to provide background information about previous work in this are& Because many of the tasks that soldiers perform require walking and carrying a load of some kind, the guidelines presented in this report are intended for exoskeletons that are capable of bipedal motion, able to augment the user's strength, and able to enhance the user's endurance. Aspects of anatomy, biomechanics, human performance, and physiology relevant to the design of an exoskeleton are presented. These fundamental human characteristics must be considered in the design of a machine that must work so closely with its user. In addition to the human engineering design guidelines, potential problems associated with exoskeletons are discussed. Finally, areas of the unique interface between the user and the exoskeleton that need further research are listed.

DTIC
Degrees of Freedom; Exoskeletons; Flexible Bodies; Human Factors Engineering; Human Performance; Man Machine Systems;

N96-17390# SRI International Corp., Menlo Park, CA.
Audition and vision in virtual environments Semiannual Report
Piantanida, Thomas P.; Mar. 1995 26 p
Contract(s)/Grant(s): (N00014-94-C-0097)
Report No.(s): (AD-A299540) Avail: CASI HC A03/MF A01

During the first year of this project, virtual environment (VE) systems were configured to perform target detection tests using time-to-detection and pathlength-to-detection metrics. The target detection studies disclosed performance differences between real an VEs that suggest that traditional relative and absolute visual orientation cues may not provide beneficial information in VEs. For some subjects, inclusion of orientation cues (achromatic and chromatic longitude and latitude grids) impaired target detection performance, while in others it improved performance, but not significantly.
CASI
Image Processing; Orientation; Target Acquisition; Virtual Reality; Visual Stimuli;

55 SPACE BIOLOGY

Includes exobiology; planetary biology; and extraterrestrial life.

No abstracts in this category.

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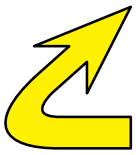

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